

Research Article

Challenges and Opportunities in Participatory Forest Management Within Ol Bolossat Forest, Kenya

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Abstract

The introduction of Participatory Forestry Management (PFM) in Kenya from 1997 has led to the formation of community-based organizations which have come to be referred to as Community Forest Associations (CFAs). Most of the CFAs are preparing to enter into forest management agreements with the Kenya Forest Service (KFS). This will confer management roles to the community with the KFS retaining the forest resource ownership right and the right to withdraw the agreement in total or part. The CFAs are formed by individual members who join by paying a prescribed membership fee. Both qualitative and quantitative methods were used in data collection, analysis and presentation. Oral interviews with 221 members of the CFA and observation were used in data collection. Data analysis was done in Statistical Package for Social Sciences (SPSS). Study findings were presented as tables, charts and in text form. In addition, multiple regression analysis, which was inferential procedure, was done. The findings showed that participatory forest management in Ol Bolossat forest has significant impacts on the livelihoods of adjacent communities. Main challenges to PFM were lack of technical knowledge and information, poor management and voluntary work not being popular. The community, therefore, required training and capacity building on development, processing technologies, value addition and marketing of Non Wood Forest Products (NWFP) among others.

Keywords

Challenges in PFM, Opportunities in PFM, Forest Degradation, Forest Restoration, Forest Conservation, Kenya

1. Introduction

In the 1970 the management of forest in most countries was succinctly state-centred [1]. However, the local community felt they were neglected in the management, resulting to seclusion from benefits accruing to them as stakeholders in the forest resource [2]. This led to advocacy and activism against the centralized management of forest, which deliberately allowed local communities members to be incorporated into forest governance through participatory forest management (PFM) [3, 4]. Participatory forestry refers to processes and mechanisms that enable those people who have a direct stake

in forest resources to be part of decision-making in all aspects of forest management, from managing resources to formulating and implementing institutional frameworks [5]. The World Forestry Congress, held in Jakarta in 1978, themed “Forests for People”, internalized the PFM and allowed forest adjacent local communities to be involved in forest management [6]. This catapulted countries in Asia and Africa to encourage the participation of rural communities in the management and utilisation of natural forests and woodlands through some form of Participatory Forest Management

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Received: 6 April 2025; **Accepted:** 18 April 2025; **Published:** 14 May 2025



(PFM) [7]. Many countries have now developed, or are in the process of developing, changes to national policies and legislation that institutionalise PFM [8, 9]. As a result, there is great variability in the institutional arrangements of PFM, ranging from community ownership and management of forest resources to partnerships for forest management between the state and local communities, and devolution of management of forest resources from the state to individual households [10]. Collectively they represent a new set of relationships between the state (usually through Kenya Forest Service) and people living in and close to forests.

Participatory Forest Management (PFM) was introduced in Kenya mainly as a result of local and national pressure led by communities and civil society organizations to reduce forest destruction in the backdrop of global clamour for partnerships in forest management. Participatory forest management was to be a major departure from the government-centered approach of command and control that also targeted the production of industrial wood as opposed to the provision of forest goods and services for the benefit of local communities. This alternative management approach was piloted in Arabuko-Sokoke Forest in 1997. The successful piloting was followed by national implementation of PFM as an alternative forest management approach in Kenya. Currently, PFM has been implemented in every forest station in Kenya under the guidance of Kenya Forest Service since the Government of Kenya ratification of the Forests Act 2005 repealing Forest Act CAP 385 [11] later replaced by Forest Conservation and Management Act (FCMA) 2016.

Arising from this new policy and law, new institutions are emerging to implement the process of involving local communities in the management of forest resources. These institutions are being established with the aim of co-managing forest resources with National and County Government institutions such as the Kenya Forest Service (KFS) and the County Governments (CGs). In order for the local communities to enter into such co-management arrangements, they are legally expected to form and register Community Forest Associations (CFAs) within different forests distributed across the country. This has resulted in the formation of about 233 CFAs distributed across the country. All of the important forest regions in Kenya, often referred to as the country's water towers, have at least one registered CFA. Most of the community forest associations (21) are located within the Mau forest ecosystem, which is the most important catchment for Lake Victoria. This is followed by the Arabuko-Sokoke Forest ecosystem which has seven forest associations. Mt. Kenya Forest has twenty six forest associations with Meru Protection and Environmental Conservation Association (MEPECAP) being very well established. Other forest associations in the country are found in the Cherenganyi Forest (11), Mt. Elgon (9), Kakamega (4), and other small forest ecosystems that have a combined number of 10 forest associations. The CFAs have to be vetted based on the following criteria before it can be allowed to operate: its objectives,

composition of its management committee, election procedures, and the purpose for which its funds may be used. Despite all these requirements, CFAs just like any other institution may be mismanaged and eventually collapse. Lack of homogeneity may also affect their forest management objectives and this in effect may have an impact on the sustainability of the forest resources to which they are to serve the adjacent forest communities.

In Kenya, not all the CFAs are active, some are under organizational review while others are non-functional. This shows numerous associations operating in Kenya are facing managerial challenges that may hinder their operations. However, there is little information available on the challenges and opportunities in these CFAs. Therefore, the aim of this study was to determine the challenges and opportunities in Participatory Forest Management using Ol Bolossat Forest as a case in point.

This study applies the Sustainable Livelihoods Approach (SLA) as a framework to comprehend the contribution of community-based enterprises and sustainable forestry to improved livelihoods, among those dependent on forest resources [12]. The SLA a comprehensive understanding how the community-based enterprises (e.g., commercial tree growing business enterprises, beekeeping, eco-tourism, forest product projects) can improve the economic opportunities while increasing the income and livelihood opportunities for local people relying on the forest resource [13]. The framework help in understanding the influence of sustainable forestry practices through forest based enterprises on community livelihoods, ensuring that forest management benefits local communities and contributes to their overall well-being. Analysis of the community context, assets, and strategies allow SLA to identify opportunities of enhance livelihoods while promoting sustainable forest management.

2. Methodology

2.1. The Study Area

The study was carried out at Ol Bolossat forest which is a catchment protection area for Lake Ol Bolossat and is part of the larger Aberdares Ecosystem located in Nyandarua County, Kenya (Figure 1). Ol Bolossat forest lies between latitude 0°01" North and 0°05" South of the Equator and between longitudes 36°17" East and 36°22" East at an altitude of 2400 m asl. It is located near Nyahururu town and is on the western side of the Aberdares Ranges. Temperature range from a minimum of 6.0°C during the night and 23°C during the day. Rainfall distribution is between 750 mm and 1500 mm with long rains in April to July and short rains in November to December. Population density was 130 to 910 persons per km² [14] with many residents practicing both subsistence and commercial farming. It occupies an area of approximately 3,328 hectares.

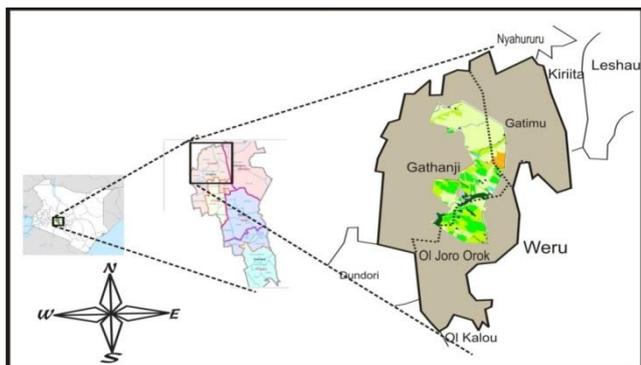


Figure 1. Map of Ol Bolossat Forest within Nyandarua County (Source: Department of Resource Survey and Remote Sensing; Lands at satellite image (27 Jan 2000, 169/060).

2.2. Research Design

The study employed a descriptive survey research design [15]. A descriptive survey is a design used to collect data from members of a population in order to determine the status of that population with respect to one or more variables. The design’s intention is to produce statistical information about various aspects of an existing phenomenon, especially for policy formulation and implementation.

2.3. Target Population, Sample Size and Sampling Technique

The study targeted the households of Ol Bolossat forest adjacent communities, and Community Forest Associations (CFA). The other respondents such as the Forest User group officials were key informants. The population adjacent to the forest was 85,825 in 15,311 households [14]. Ol Bolossat CFA has a membership of 2,899 [18]. The distribution of households and CFAs are provided in Table 1.

The sample size for the CFAs was determined by using the formula $n = \frac{z^2 p(1-p)}{d^2}$ [16]

Where: n = the desired sample size; z = the z score at the desired confidence level (i.e z = 2.475); p = the proportion community with positive impacts on forest management, conservation and rehabilitation (p = 10% = 0.1); d = permissible marginal error (i.e the level of statistical significance, set at $\alpha = 0.05$). Using the values of z, p and d, the value of n was computed as:

$$n = \frac{2.475^2 \times 0.1(1-0.1)}{0.05^2} = 220.5 \approx 221.$$

Therefore, the sample size for the CFAs was 221. The distribution of sample size of the CFAs are provided in Table 1.

Table 1. Population Distribution, and sample size of the households and CFAs in Ol Bolossat Forest Adjacent Community.

Households			CFAs		
Area (Sub-Location) ¹	Population ¹	Households	CFA Units	Population	Sample size
Oraimutia	3,834	944	Bahati	500	38.1
Lesriko	7,376	1,969	Boike	700	53.4
Silibwet	13,621	3,265	Busara	350	26.7
Gathanji	7,710	1,831	Gathanji	264	20.1
Kanguo	3,577	909	Gatimu	250	19.1
Gatimu	13,600	3,675	Gikingi	235	17.9
Gikingi	9,164	2,718	Nyakarianga	200	15.2
Total	58,882	15,311	Oljoro-orok	400	30.5
			Total	2899	221

¹Source: [14]

2.4. Data Collection Tools

The data through document analysis of records within the Community Forest Association (CFA) office and further information obtained from oral interview with the members of the CFAs. The interview was designed to capture infor-

mation on Challenges in Conservation among the CFAs members in Ol Bolosat, logistic challenges and constraints faced by group members, strengths and opportunities faced by group members and ways of making forest more beneficial. The researcher also strengthened the response of the data by survey of the farmers in the study area to observe the activities.

2.5. Methods of Data Collection

The study consisted of a Comprehensive Participatory Rural Appraisals (PRAs) comprising of interview with the CFAs complemented with the user group officials. A total of 221 CFAs out of 2,899 CFA members were selected for this study within the eight units. The general approach was to interview the head of the household. If the head was not available, a spouse or a child (above 18 years old) from the family was interviewed. In the second phase, key informant interviews was conducted to support the information on the questionnaires and interviews.

2.6. Data Analysis

Data were analyzed descriptively, which involved the use of means \pm SD and frequency distributions for categorical data sets. Descriptive analysis therefore, gave general description of the collected responses.

3. Results and Discussion

3.1. Challenges in PFM and Conservation

The first challenges the communities faced was involved with conservation efforts (Table 2). The main one was lack of volunteers in the conservation work since they are not paid.

Such challenge has been reported to be a major challenge in CFAs in Africa [17], having been reported in other CFAs such in Kenya [19], in Sefwi-Wiawso forest district, Ghana [20]. The forest members need to volunteer at time without pay to actively engage in conservation efforts and absence of such voluntary undertakings weakens the CFAs. Despite this being labeled a challenge, many local community members always turn out in large numbers during voluntary conservation activities like planting and forest fire fighting (Key informant 1). Being a voluntary work, the communities turned up and participated in raising of seedlings, planting and protection. The second most important challenge in conservation was time limit constraints because many members reported that they also have other issues to attend to and therefore limit of time in management is reported among the CFAs, which has been reported in other CFAs in Burkina Faso [21]. Lack of technical knowledge and information among members was also cited as a challenge which is similar to those reported in other CFAs in Kenya [18, 19], South Africa [22] and Ghana [23]. Moreover, poor local managerial leadership was another factor cited that was cited as a major challenge which has been reported in also in Malawi [24], Ethiopia [25], Cameroun [26] and Uganda [27]. The other challenges like strict regulations and lack of enough land were reported by few respondents. Farm sizes in the surrounding communities are small hence high demand for forest Plantation Establishment and Livelihood Improvement Scheme (PELIS) plots for cultivation (Key informant 2).

Table 2. Challenges in Conservation among the CFAs members in OI Bolosat.

Challenges in PFM and Conservation	Respondents	Percent
Lack of volunteers in the conservation work	81	36.7
Time limit constrain for management	35	15.8
Lack of technical knowledge & information	29	13.3
Poor local managerial leadership	28	12.5
Strict regulations	13	5.8
Lack of enough land	11	5.0
Total	221	100

3.2. OI Bolossat CFA Logistic Challenges

In order to be fully involved in conservation activities, members of the CFA, the communities faced several logistic challenges such as lack of capital (money), water to establish tree nurseries, lack of training and capacity building and inadequate production materials. Other challenges include incompetent labor contribution, poor projects management and inadequate land to carry out the activities as shown in Table 3.

Table 3. Logistic Challenges and Constraints Faced By Group Members.

Logistic challenges & Constraints	Respondents	Percent
Lack of training	57	25.8
Lack of money	53	24.0

Logistic challenges & Constraints	Respondents	Percent
Management	30	13.6
Materials	28	12.7
Water	27	12.2
Contribution of labor	24	10.9
Lack of sites	21	9.5
Total	221	100

Lack of capacity building and training on Nature Based Enterprises (NBE) at OI Bolossat forest community groups was a big challenge. Lack of capital to start some of NBEs was also major challenge which can be addressed by development partners support or local resources mobilization. Management and lack of production materials were also among the challenges facing the forest adjacent communities. However, as a solution to labor crisis, the communities were ready to provide labor, time and energy if some sites and support of materials are availed to carry out NBE activities.

3.3. Policy Challenges

The study established some inconsistent directives which negatively affect the smooth working of the OI Bolossat CFA. In October 2010 the grazing of livestock in the forest was suspended until the CFA and KFS had to draw a grazing plan, conduct livestock carrying capacity and maintain grazing registers. The directive came from the NEMA, which was concerned with overgrazing in the forest areas and degradation of natural resources. At OI Bolossat forest there are over-mature plantations which cannot be harvested due to ban on timber harvesting which was effected in the year 2000. The ban has affected forest plantation and management practices.

The ban on timber harvesting in state forest plantations since the year 2000 has resulted to deterioration of mature forest plantations through biological deaths, windfalls, heart rot and fires. This has resulted to great loss in value of over 1 billion USD annually and increased management costs [28]. To meet industrial wood demand Kenya spends more than Ksh. 250 million USD annually on importation of timber and transmission poles that can be supplied locally from industrial forest plantations thus saving the foreign exchange.

Economic, environmental and community needs have to be integrated for sustainable development. Sustainable forest management is all about conducting meaningful discussions with all stakeholders and appreciating multiple use approaches at all levels and putting in place appropriate forest policies and laws [29]. Sustainable forest management rests on a foundation of key building blocks on formulating policies and legislations which drive forest sector by defining the relationship between national and county governments in the forest sector. Reframing opinions between

commercial forestry and environmental stewardship is also an aspect of sustainable forest management. Making decision based on interdisciplinary science and ensuring public participation and ownership of the management processes was also found to be crucial in forest management and conservation.

It was found that the level of public participation in OI Bolossat forest adjacent communities was 75.8%. This participation had been integrated in all forest management and conservation aspects. Farm forestry was being carried out well and taken as a commercial venture. On the other hand, agroforestry systems were being practiced to improve food productivity and livestock rearing. Interaction of KFS, CFA and User groups for smooth running and management of the forest was found to be a crucial aspect of in addressing challenges experienced in PFM implementation. The institutions were well defined and minimal conflict was experienced at OI Bolossat forest between the grazers and PELIS cultivation groups. Previously, conflict between these two groups arose because opening of PELIS plots for cultivation reduced the grazing areas and sometimes unattended cattle strayed in the cultivated areas and destroyed food crops. To address most of the conflicts, the user groups followed and implemented the management plans for PELIS cultivation and grazing plans according to the zoned areas for each activity.

3.4. Opportunities in the Implementation of PFM in OI Bolossat Forest

In the study area, forests are in summary main resources. Opportunities come through Plantation Establishment and Livelihoods Improvement Scheme (PELIS) projects and livestock farming among others. By formulating and implementing proper policies, the projects were highly favored, noting that there was availability of grazing land in the forest. Water was also a major resource from the forest, which is the catchment area feeding several streams, tributaries of Ewaso Narok river, which forms the famous Thomson Falls at Nyahururu and joins Ewaso Nyiro river.

3.4.1. PFM Success in the Conservation of OI Bolossat Forest

There are quite a number of strength and opportunities identified while implementing PFM. The communities appreciated mainly the devolved governance which embraces community participation and empowers the communities to take part in natural resources management. Moreover, the government has sensitized the communities and created awareness about PFM. In addition, PFM success has been attributed to enforcement of the community by-laws and rules. Successes of the identified strengths and/or opportunities in the implementation of PFM are attributed to certain factors, which are summarized in Table 4.

Table 4. Strengths and Opportunities faced by group members.

NBE strength & opportunities faced	Respondents	Percent %
Community Participation	77	35
Community Empowerment	64	29
Sensitization and awareness creation	46	21
By laws and rules enforcement	34	15
Total	221	100

There was improvement and acceptance of NBE by Ol Bolossat forest adjacent communities through participation and empowerment to improve their livelihood. These are great opportunities and strength where communities can take lead in shaping their destiny. Using community sensitization, awareness creation, rule of laws and enforcement of rules, the user groups had made strides in protection, conservation and management of Ol Bolossat forest.

3.4.2. Development Partners Within Ol Bolossat Forest

It was established that in Ol Bolossat forest, there are a number of development partners carrying out activities to improve on forest management and conservation and the overall community livelihoods. Community Development Trust Fund (CDTF) through European Union (EU), Government of Denmark DANIDA International Development Cooperation, Government of Kenya (GoK) and communities supported development of PFM processes and writing of PFMP for Ol Bolossat forest from 2008 to 2010. The CDTF Community Environmental Facility (CEF) supported rehabilitation of tree nursery with water pump, tanks, tools and equipments at Gathanje to boost seedlings production for both exotic and indigenous tree species for industrial forest plantation and rehabilitation of degraded sites. The CDTF supported training and uniform for twenty community scouts among the youth at Ol Bolossat to improve on forest protection and employment creation.

Green Zones Development Support Project (GZDSP), through a partnership between African Development Bank (ADB), the GoK and communities promote biodiversity conservation, contribute to poverty reduction, and improve rural livelihood and incomes of communities living adjacent to the forest. The aim of this collaborated effort is improvement of forest cover for water conservation. At Ol Bolossat forest GZDSP supported natural forest rehabilitation of degraded sites, participatory natural forest management, restoration of community watersheds, promotion of woodlot establishment and agroforestry development on farm forestry services.

International Union for the Conservation of Nature (IUCN),

Netherlands' Ecosystem Grant Program, through the East African Wild Life Society (EAWLS) and Kenya Wetlands Forum (KWF) with Friends of Lake Ol Bolossat (FOLO), supported Nyakariang'a Unit of Ol Bolossat CFA with Langstroth bee hives, bee capture box, centrifugal machine for honey processing, bee kit (complete with one bee suit, hive tool, gumboots, torch, bee brush and bag) for support of NBE/IGAs in enhancing livelihoods and nature conservation.

Nyandarua County Government supported the Ol Bolossat CFA with rehabilitation of Oraimotia river banks with indigenous tree seedlings. Kenya Commercial Bank (KCB) held their community tree planting day at Ol Bolossat forest and over 3,000 tree seedlings were planted in the degraded sites. Greening Kenya Foundation (GKF), a Non Governmental Organization, carried out Gitwe/ Gikingi spring rehabilitation by planting 2,000 seedlings for watershed protection. Participatory Forest Management program, through involvement of Community participation and implementation, has contributed to conservation of Ol Bolossat Forest Station. The study established that people's perception to forest conservation was very high such that forests influence the attraction of rainfall and climate change stabilization followed by provision of forest products.

3.4.3. Expanded Areas Under Industrial Forest Plantations

Ol Bolossat Forest Station has opened 989 ha under Plantation Establishment and Livelihoods Improvement Scheme (PELIS) and 905.7 ha have been planted in the last six years since 2007 to 2012. In these recently afforested areas, tree seedlings survival was impressive at 85%. The study found a consistence increased trend on industrial forest plantation establishment and natural forest rehabilitation with a total of 905.7 ha and 185.9 ha respectively. Expanded areas under industrial forest plantations that comprise entirely exotic tree species such as pines, cypress, blue gum and *Grevillea robusta* are the primary source of timber for the construction industry, furniture workshops, plywood, pulpwood and power transmission poles industries.

It was established that with community participation and cultivation under PELIS the forest adjacent community enhanced industrial forest plantation establishment and food production hence improving their livelihoods and increase in forest cover. The trend concurs with report on plantation establishment in Kenya through the shamba system [28].

3.4.4. Benefits Derived from Ol Bolossat Forest

According to study findings, the best way of making the forest more beneficial was by carrying out natural forest rehabilitation of the degraded areas. These efforts would increase forest goods and services in terms volumes, quality and quantity of water and river flow. Cultivation was through PELIS in industrial forest plantation areas for timber, fuel wood, poles and crop production to address food security which contributed over 1.7 million dollars to locals (*Pers.*

Comm.). Conservation of the remaining forest was to ameliorate climate change and biodiversity conservation. Benefit and cost sharing was done through corporate social responsibility support to infrastructure, roads, bridges, cattle dips and schools. Employment and wealth creation was through casual labor and community scouts for protection. Controlled grazing was done in the zoned grazing areas where cut and carry of grass was advocated for increased milk production. Ways to make forest more beneficial was summarized as shown in Table 5.

Table 5. Ways of Making Forest More Beneficial.

Ways of making forest more beneficial	Respondents	Percent %
Rehabilitation	115	52
Cultivation PELIS	44	20
Conserved forest	40	18
Employment creation	11	5
Benefit and cost sharing	7	3
Controlled grazing	4	2
Total	221	100

4. Conclusions

Further, the study findings showed that education, training, empowerment of Ol Bolossat CFA officials and members, user groups and farmers have improved communal participation in PFM. This has led to proper management and conservation of the forest and the associated resources. Consequently, there has been significant improvement in the overall livelihood of the adjacent communities. It was also found that Ol Bolossat forest is a home of several important cultural sites, recreational, traditional, religious, spiritual and sacred sites which, if properly utilized, can benefit forest adjacent communities and provides alternative livelihoods. This finding implied that utilization of NBE at Ol Bolossat forest is not yet optimal. There is therefore potential of several Nature Based Enterprises to be introduced to improve the community livelihoods and provide incomes.

In summary, the study findings showed that the nature based enterprises of the Ol Bolossat forest adjacent communities have significant impacts on the livelihoods of the surrounding community. From the findings, there was a strong positive relationship between the overall livelihood of adjacent communities and PFM and community participation, community local structures, PFM enterprises, coordination of PFM activities and forest management and conservation policies.

5. Recommendations

The community requires training and capacity building on development, processing technologies and marketing for the Non Wood Forest Products (NWFP) and provision of sufficient economic incentives to promote potential nature based enterprises. Training Ol Bolossat CFA community members on emerging issues pertaining to group dynamics that improve governance, transparency and accountability on participatory natural resources management will help them become more successful in forest management.

There is need to ensure economic benefits to the forest adjacent communities through value addition chain and encourage sustainable utilization of natural resources. In order to identify the challenges and opportunities to PFM implementation in forests, adjacent communities should be aware of local structures, PFM enterprises, PFM activities and forest management and conservation policies towards effective conservation of the forests.

Abbreviations

CFA	Community Forest Associations
FCMA	Forest Conservation and Management Act
FGD	Focus Group Discussions
NWFP	Non Wood Forest Products
PELIS	Plantation Establishment and Livelihoods Improvement Scheme
PFM	Participatory Forest Management
PRA	Comprehensive Participatory Rural Appraisals

Acknowledgments

The author immensely thanks the household members at Ol Bolossat for agreeing to take part in this study.

Author Contributions

Benjamin Mutuku Kinyili is the sole author. The author read and approved the final manuscript.

Funding

This work is not supported by any external funding.

Data Availability Statement

The data is available from the corresponding author upon reasonable request.

Conflicts of Interest

The author declares no conflicts of interest.

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